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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
M.Tech I Year I Semester Regular & Supplementary Examinations February 2018
ADVANCED PRESTRESSED CONCRETE
(Structural Engineering)

Time: 3 hours Max. Marks:60

(Answer all Five Units **5 X 12 =60** Marks)

UNIT-I

1	a	Explain the historical development of Prestressed concrete.	6M
	b	What are the advantages of prestressed concrete?	6M

OR

2	a	Explain the Hoyer's long line system of pretensioning.	6M
	b	Explain the Lee-McCall system with a neat sketch.	6M

UNIT-II

3 A prestressed concrete beam, 200 mm wide and 300 mm deep, is prestressed with wires(area=320mm^2) located at a constant eccentricity of 50 mm and carrying an initial stress of 1000 N/mm^2. The span of the beam is 10 m. calculate the percentage loss of stress in wires if a) the beam is pretensioned, and b) the beam is post tensioned. 12M

OR

4 A concrete beam *AB* of span 12 m id post-tensioned by a cable which is concentric at supports *A* and *B* and has an eccentricity of 200 mm in the mid-third span with a linear variation towards the supports. If the cable is tensioned at the jacking-end *A*, what should be the jacking stress in the wires if he stress at *B* is to be 1000 N/mm^2. Assume the coefficient of friction between the cable duct and concrete as 0.55 and the friction coefficient for the wave effect as 0.0015/m. 12M

UNIT-III

5 A post tensioned pre-stressed concrete Tee beam having a flange width of 1200 mm and flange thickness of 200 mm, thickness of web being 300 mm is pre-stressed by 2000 mm^2 of high-tensile steel located at an effective depth of 1600 mm. If f_{ck}=40 N/mm^2 and f_p=1600 N/mm^2, estimate the ultimate flexural strength of the unbounded tee section, assuming span/depth ratio as 20 and f_{pe}=1000 N/mm^2. 12M

OR

6 A pre-tensioned, T-section has a flange 1200 mm wide and 150 mm thick. The width and depth of the rib are 300 and 1500 mm respectively. The high-tensile steel has an area of 4700 mm^2 and is located at an effective depth of 1600 mm. If the characteristic cube strength of the concrete and the tensile strength of steel are 40 and 1600 N/mm^2, respectively, calculate the flexural strength of the T-section. 12M

UNIT-IV

7 A concrete beam of rectangular section has a width of 250 mm and depth of 600 mm. the beam is pre-stressed by a parabolic cable carrying an effective force of 1000 KN. The cable is concentric at supports and has a maximum eccentricity of 100 mm at the centre of the span. The beam pans over 10 m and supports a uniformly distributed live load of 20 KN/m. assuming the density of concrete as 24 KN/m^3, estimate a) the maximum principal stress developed in the section of the beam at a distance of 300 mm from the support, b) the presressing force required to nullify the shear force due to dead & live loads at the support section 12M

OR

8 A prestressed I-section has the following properties:

Area =$(55*10^3)$ mm^2

Second moment of area=$(189*10^7)$ mm^4

Statical moment about the centroid=$(468*10^4)$ mm^3

Thickness of web = 50 mm

It is prestressed horizontally by 24 wires of 5 mm diameter and vertically by similar wires at 150 mm centers. All the wires carry a tensile stress of 900 N/mm^2. Calculate the principal stresses at the centroid when a shearing force of 80KN acts upon this section. 12M

UNIT-V

9 A cylindrical prestressed concrete water tank of internal diameter 30 m is required to store water over a depth of 7.5 m. The permissible compressive stress in concrete at transfer is 13 N/mm^2 and the minimum compressive stress under working pressure is 1 N/mm^2. The loss ratio is 0.75. wires of 5 mm diameter with an initial stress of 1000 N/mm^2 are available for circumferential winding and Freyssinet cables made up of 12 wires of 8 mm diameter stressed to 1200 N/mm^2 are to be used for vertical prestressing. Design the tank walls assuming the base as fixed. The cube strength of concrete is 40 N/mm^2. 12M

OR

10 a. State the importance of control of deflection. 6M

b. Explain the short term deflection of un-cracked members using Mohr's theorem. 6M

***** END *****